Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. 20 Dec. 5 Nov. 20
THE DATE BELOW EACH NUMERAL WILL SHOW WHEN THAT SECTION OF THE MAP WILL BE ON THE MERIDAN—DUE SOUTH—AT 9 P.M. OR AN HOUR EARLIER
FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.

The

Monthly Evening Sky Map

A SCIENTIFIC JOURNAL AND EDUCATIONAL GUIDE IN ASTRONOMY FOR THE AMATEUR

Founded in 1905 by Leon Barritt

ALSO A STAR, CONSTELLATION AND PLANET FINDER MAP ARRANGED FOR THE CURRENT MONTHS - MORNING AND EVENING - AND PRACTICAL ANYWHERE IN THE WORLD

PUBLISHED QUARTERLY

Largest Circulation of any Amateur Astronomical Journal in the World

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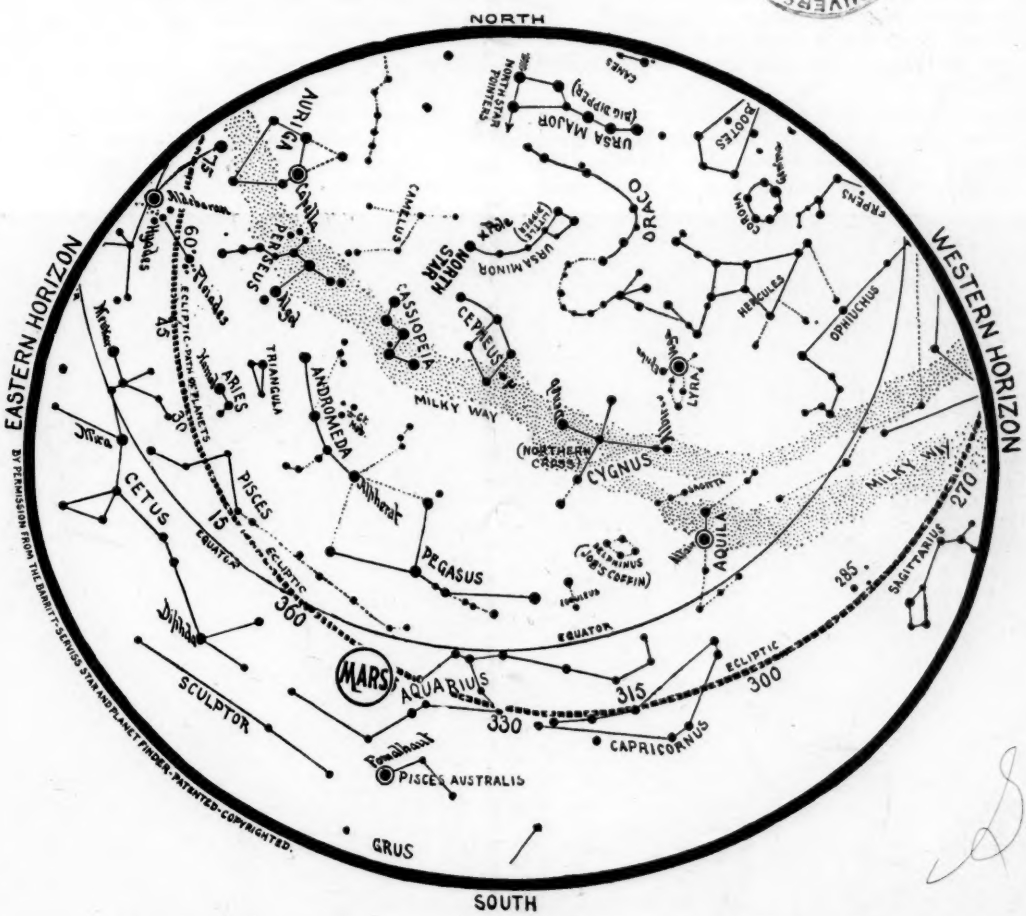
UNIVERSITY

EVENING SKY MAP FOR OCTOBER



AT 9:00 P.M., OCT. 1 **8:00 P.M., OCT. 15** **7:00 P.M., OCT: 31**

Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper.

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

XUM

METEORS

by IRVING L. MEYERS, M. S.

A remarkable photograph sent us by a subscriber, Dr. P. A. Birdick, of Yuma, Arizona, leads us to this discussion of meteors and meteorites. The earth is bombarded daily by numberless meteors ranging in size from minute grains to sizeable fragments. In "THE ASTRONOMICAL UNIVERSE", Wasley S. Krogdahl cites a figure of five to ten naked eye meteors per hour as being visible to any observer on an average clear night, with the frequency increasing greatly during "showers". When we consider that the appearance of a meteor is a pretty much local phenomenon—it does not commence to reveal itself until it is well within one hundred miles of the earth's surface, where the atmosphere is sufficiently dense to create friction —it is necessarily observable over a relatively small area of the earth's surface. Krogdahl, accordingly, estimates that 20 to 25 *million* meteors of naked-eye brightness strike the earth daily. With telescopic meteors included, the daily figure rises above 5 *billion!*. The writer has, on many an occasion, seen telescopic meteors—usually very short trails of magnitude 7 and fainter. In a twelve inch telescope, though, a seventh-magnitude meteor appears bright, and has often caused the writer to respond to reflexes by pulling his eye from the telescope, expecting to see a bright "falling star" in the sky.

Meteors are composed of rock, metals, or a combination of both, being predominently iron. Their tremendous speed of up to about 50 miles per second when they enter the earth's atmosphere, causes them to heat up to the point that they melt and become visible to the terrestrial observer as their heat brings about incandescence of the air along their path. Rarely is a meteoric particle large enough, slow enough, and following the right path that some remainder strikes the earth. However, there are many known instances, meteorites having been found throughout the world. There is one historical case of an emperor who had a sword made from meteoric iron, and was considered a sacred object by his followers. There are many famous examples of meteorites to be found in the world's museums, ranging up to many tons in weight. They must have struck the earth with an impact equivalent to a good-sized explosion. Generally, the meteoric origin of a suspected fragment can be proven by the appearance of *Widmannstatten* lines, a pattern of the crystalline structure peculiar to meteorites when a section is polished and etched with acid. These lines are a consequence of the cooling process after their blazing trip in the earth's protective air blanket.

A tremendous fireball struck in Siberia in 1908, the force being sufficient to level all trees for miles around. Another which must have dwarfed the Siberian meteor, fell in Arizona in some past age, and produced a great crater about 600 feet deep and close to a mile in diameter, with walls raised above the surrounding terrain. The writer has flown over this crater, and was struck forcibly with its resemblance to lunar craters—for examples, to Bullialdus and Timocharis. The truly ame-inspiring appearance of meteors such as these can hardly be envisioned when it is considered that authorities have computed that a particle the size of a small pea flares up to around the first magnitude; that a fragment the size of a golf ball becomes a fireball brighter than the full Moon!

FIREBALL PHOTOGRAPHED FROM YUMA, ARIZONA by P. A. BIRDICK.

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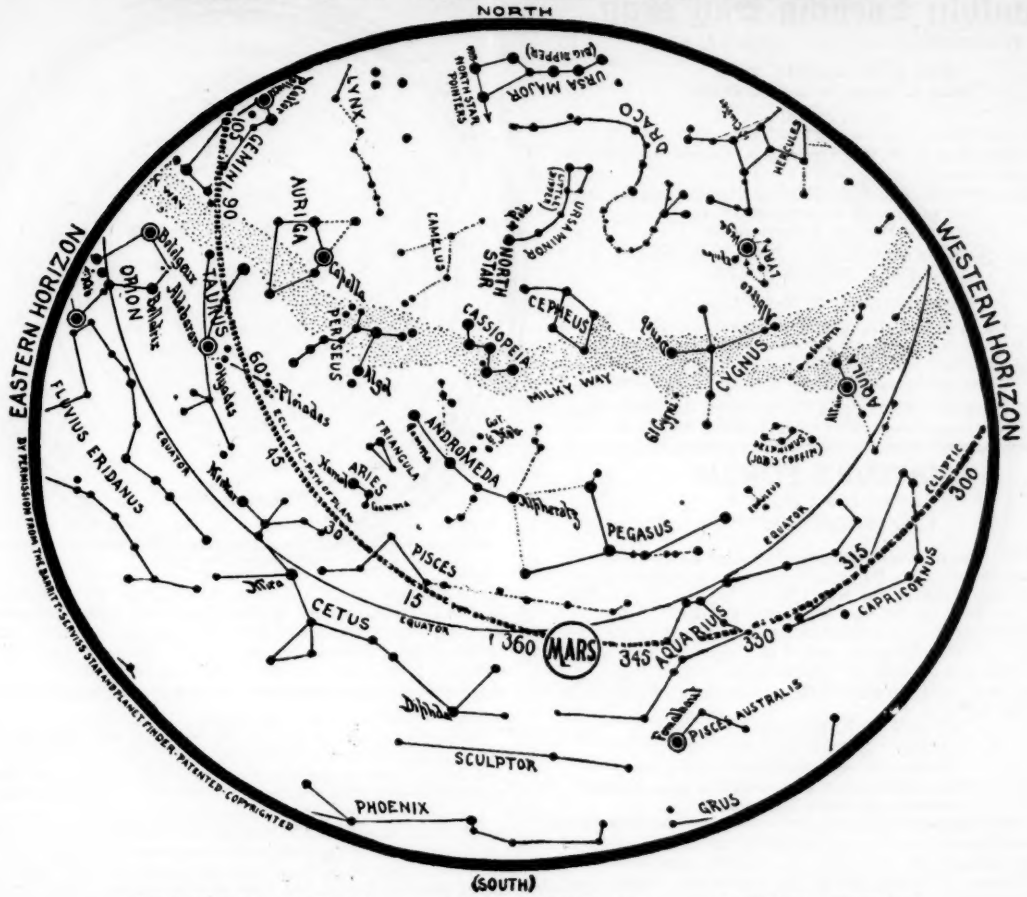
XUM

EVENING SKY MAP FOR NOVEMBER



AT 9:00 P.M., NOV. 1 **8:00 P.M., NOV. 15** **7:00 P.M., NOV: 30**

Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper. This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitudes in Europe.

The sight of a truly bright fireball is something to remember. The writer saw one in 1937, much brighter than the Moon, and which caused a tremendous stir on the east coast of the United States. The meteor photographed by Dr. Birdick and reproduced here, must have been a grand sight. When we realize that his photograph was made on color film, which is relatively insensitive, some idea of the naked-eye brightness can be gleaned. Dr. Birdick writes: "On the 27th of March this year at 11:00 P.M. (M.S.T.) I opened the shutter on a Ciroflex 2¼ x 2¼ loaded with Daylight Anscochrome. The opening was F/3.5. At about 11:12 the "Blue Green Fireball' made its brilliant but soundless track through the sky. Since I wasn't sure whether the phenomena had been in my field I left the shutter open until 11:30 to be sure of getting my original objective, the trees and pool as lit by the full Moon in a cloudless sky. The light on the horizon is a marker light of Yuma Air Base, due south of the camera position in Yuma." Unfortunately, we cannot reproduce the beautiful color of the original photograph. It is indeed a rare prize. Dr. Birdick's comment that the fireball was soundless raises another interesting observation about fireballs—though some observers have noted varying sounds caused by their passage, more often no slightest whisper results from this burst of energy and by this very fact makes the flaming apparition all the more remarkable.

When two or more reliable observations of a meteor are obtained from different locations, it is possible to compute the orbit of the particle. Presently, astronomers are in disagreement in one respect — some maintain that many meteors are not members of our solar system, but instead, come from outer space; others maintain that there is no evidence that they come from anywhere but within our system. This latter is particularly substantiated by photographic campaigns, which produce much more reliable results than visual observations and, in addition, through the use of the rotating camera shutter—generally causing 20 breaks per second in the image—duration and speed can be computed with high accuracy.

Meteors are always more abundant after midnight, because the observer then faces the direction of the earth's motion in its path about the Sun, and accordingly sees not only meteors which overtake the earth (the only ones visible before midnight) but also those which the earth overtakes or runs into. Frequency also increases more or less greatly on those nights when we have a "shower". There are at least eight recognized major shower per year, customarily designated by the constellation in which is located their radiant point. This radiant is the location on the celestial sphere marking the common point of intersection of the paths of the meteors. In the fall, the major showers are as follows:

continued on page 6

XUM

The

Monthly Evening Sky Map

FOUNDED IN 1905 BY LEON BARRITT

MRS. LEON BARRITT, Editor
Irving L. Meyer, Managing Editor

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All time is expressed in Eastern (75th Meridian) Standard Time. Add five hours to convert to Greenwich Civil Time.

AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

OCTOBER, 1956

THE SUN: is in the southern hemisphere and spends the month crossing Virgo to the Libra border. The earth, in its slightly elliptic orbit, is moving closer to the Sun. On the 1st it is 93.0 million miles from the Sun; on the 31st, 92.2 million miles.

THE MOON: is at *apogee* (farthest from the earth) on the 12th at a distance of 251,000 miles, and is at *perigee* (closest to the earth) the 27th at a distance of 230,000 miles.

Libration: Maximum exposure of the region on the Moon's limbs takes place as follows:

October 1 North limb, 6.6°
October 7 West limb, 6.1°
October 15 South limb, 6.7°
October 20 East limb, 4.6°
October 29 North limb, 6.7°

The Moon's Phases (E.S.T.):

New Moon	October 3 at 11:24 pm
First Quarter	11 at 1:44 pm
Full Moon	19 at 12:24 pm
Last Quarter	26 at 1:02 pm

MERCURY: spends the entire month in Virgo, moving in a south-eastwardly direction. It is in the morning sky during this time, and reaches greatest elongation from the Sun on the 11th. Observers who scan the eastern sky as dawn breaks will be able to spot this elusive planet close to the horizon. It will be bright—considerably brighter than a standard 1st magnitude star—and moderate magnification in the telescope will show the disc to be *gibbous*—like the Moon shortly after first quarter. This planet, incidently, only presents a perfectly round disc when at superior conjunction with the Sun, at which time it is not observable. On the 1st of the month it is 65 million miles from the earth; on the 31st distance has increased to 126 million miles.

VENUS: is a morning star the whole month, appearing in Leo on the 1st, and moving along the ecliptic through this constellation into Virgo by month-end. In the telescope the planet is decidedly gibbous, with a greater percentage of the surface becoming illuminated daily, as seen from earth, thereby offsetting increasing distance to the extent that brightness hardly varies. On the 1st distance from the earth is 87 million miles, magnitude is -3.7, and the disc is 64% illuminated; on the 31st, distance is 106 million miles, magnitude -3.5, and illumination 75%. It is well placed for pre-dawn observation.

MARS: dominates the night sky. A brilliant, reddish star in Aquarius, it is still close to the earth, though receding, and is well placed for observation from both northern and southern hemispheres. On the 1st, distance is 39 million miles, magnitude is -2.2, and apparent diameter 22". On the 31st, distance is 53 million miles, magnitude -1.3, and apparent diameter 16". This is such an exceptional approach of the planet that even at month-end it is closer and brighter than at many oppositions.

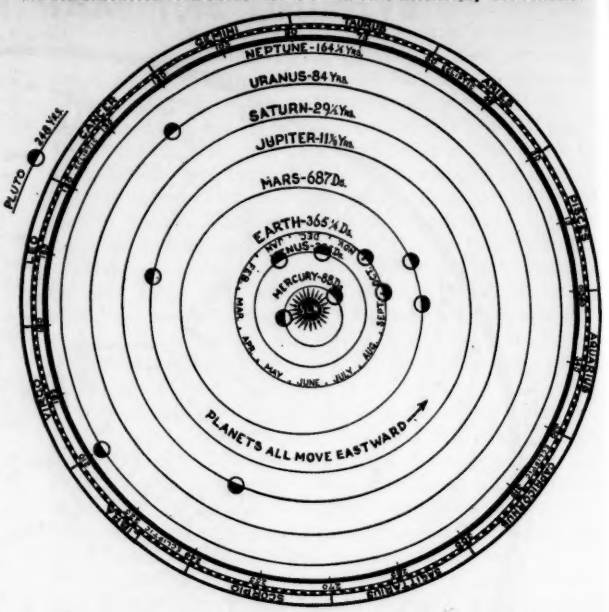
JUPITER: is just north of the equator, in Virgo. In the morning sky, it is rather close to the Sun the beginning of the month for worthwhile observation. However, its observability improves rapidly, and by month-end is well placed in the pre-dawn sky. On the 25th there is a close conjunction of Jupiter and Venus, which always is a sight which can hardly be equalled. The two brilliants will be separated by a distance considerably less than one-half the apparent diameter of the Moon. Jupiter at the time is 572 million miles from the earth, and magnitude -1.3.

SATURN: is in Scorpio in the evening sky, shining a little brighter than its near neighbor, Antares. It sets shortly after dark, and is too close to the Sun for worthwhile observation. Distance the 15th is 999 million miles.

URANUS: is technically a morning star, as it rises around midnight. It is just south of Praesepe, the famous cluster in Cancer. At magnitude 6 it can just be made out with the naked on under good conditions. Moderate power with a telescope will reveal a neat, round disc. Its distance, the 15th, is 1745 million miles.

NEPTUNE: is in conjunction with the Sun on the 23rd and thereafter enters the morning sky. It is too close to the Sun all month to be observed. Distance reaches a maximum on the 23rd at 2910 million miles.

HELIOCENTRIC POSITIONS OF THE PLANETS, OCTOBER



The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month are given for Mercury, Venus, Earth, and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus, Neptune, and Pluto are shown in their mean position for the current month.

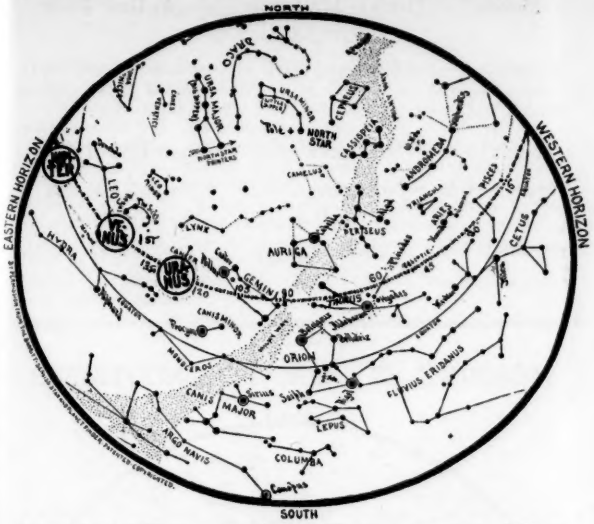
ASTRONOMICAL CALENDAR

Eastern Standard Time

OCTOBER, 1956

Oct.	2—12:41 pm	Minimum of Algol
	2— 1:19 pm	Conjunction, Jupiter and Moon; Jupiter north 6° 18'
	3— 4:08 am	Conjunction, Mercury and Moon; Mercury north 4° 26'
	4— 1:— am	Venus in ascending node
	4—10:— am	Mercury in ascending node
	4— 4:— pm	Mercury stationary in Right Ascension
	5— 9:30 am	Minimum of Algol
	5—10:10 am	Conjunction, Neptune and Moon; Neptune north 4° 27'
	7— 2:58 pm	Conjunction, Saturn and Moon; Saturn north 1° 47'
	8— 6:19 am	Minimum of Algol
	9— 2:— am	Mercury in perihelion
	11— 3:07 am	Minimum of Algol
	11— 9:— pm	Mercury greatest elongation west, 18° 4'
	12— 6:— pm	Mars stationary in Right Ascension
	13—11:56 pm	Minimum of Algol
	16—10:29 am	Conjunction, Mars and Moon; Mars south 9° 0'
	16— 8:45 pm	Minimum of Algol
	19— 8:— am	Mercury greatest heliocentric latitude north
	19— 5:34 pm	Minimum of Algol
	22— 2.22 pm	Minimum of Algol
	23— 9:— am	Conjunctive, Neptune and Sun
	25— 9:— am	Conjunctive, Venus and Jupiter; Venus north 0° 13'
	25—11:11 am	Minimum of Algol

MORNING SKY MAP FOR OCTOBER



At 5:00 A.M., OCT. 1; 4:00 A.M., OCT. 15; 3:00 A.M., OCT. 31

26—	9:30 pm	Conjunction, Uranus and Moon; Uranus north 5° 40'
28—	8:00 am	Minimum of Algol
30—	4:— am	Quadrature, Uranus and Sun
30—	6:25 am	Conjunction, Jupiter and Moon; Jupiter north 6° 15'
30—	3:35 pm	Conjunction, Venus and Moon; Venus north 6° 25'
31—	4:49 am	Minimum of Algol
31—	Noon	Conjunction, Mercury and Neptune; Mercury south 0° 29'

AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

NOVEMBER, 1956

THE SUN: crosses Libra and moves well into Scorpio as it moves deeper into the southern heavens. The earth continues to move nearer the Sun—from 92.2 million miles the 1st, to 91.6 million miles the 30th.

THE MOON: is farthest from the earth the 9th at 251,000 miles, and is closest the 21st at 228,000 miles.

Libration: Maximum exposure of the region on the Moon's limbs takes place as follows:

November 3	West limb,	5.3°
November 12	South limb,	6.8°
November 16	East limb,	5.3°
November 25	North limb,	6.8°
November 29	West limb,	5.4°

The Moon's Phases (E.S.T.):

New Moon	November 2 at	11:43 am
First Quarter	10 at	10:09 am
Full Moon	18 at	1:44 am
Last Quarter	24 at	8:12 pm

There will be a total eclipse of the Moon on the night of November 17-18. This eclipse will be visible over all North and South America and large portions of Europe and Africa. The circumstances of the eclipse follows (E.S.T.):

Moon enters penumbra	November 17 at 11:00 pm
Moon enters umbra	18 at 12:03 am
Total eclipse begins	18 at 1:08 am
Middle of the eclipse	18 at 1:48 am
Total eclipse ends	18 at 2:27 am
Moon leaves umbra	18 at 3:33 am
Moon leaves penumbra	18 at 4:35 am

The magnitude of the eclipse is 1.323, where the Moon's diameter is 1.

MERCURY: moves from Virgo through Libra and northern Scorpio, into the southern extremity of Ophiuchus. It is not observable all month, and is in superior conjunction with the Sun on the 12th, after which it enters the evening sky. It is farthest from the earth the 17th at 135 million miles.

VENUS: continues in the morning sky, commencing the month close to Jupiter in Virgo, crossing the equator into the southern hemisphere and arriving at a point on the eastern edge of Virgo by the end of the month. On the 26th it is only 11' north of Neptune. However, the contrast is tremendous, as Venus is some 33,000 times brighter than Neptune! The gibbous disc of Venus averages about 13" in apparent diameter. Distance from the earth increases from 107 million miles the 1st to 123 million miles the 30th.

MARS: travels from Aquarius into Pisces, to a point just south of the equator. It is still a very bright planet, very well placed for observation. It sets well after midnight. On the 1st it is 53 million miles from the earth, magnitude is -1.3, and apparent diameter is 16"; on the 30th, distance is 73 million miles, magnitude -0.4, and diameter 12". With a power of 100 diameters or more, the telescope will reveal much of interest on the planet, including the polar cap.

JUPITER: in Virgo, is assuming a prominent position in the morning sky. It is still a long way from opposition, but is so large a planet that it is always bright, and large in the telescope. Good opera glasses or binoculars will reveal the bright satellites (which could be seen with the naked eye if Jupiter were not so close). On the 15th, distance is 549 million miles.

SATURN: is in Scorpio, too close to the Sun all month to be observable. It is in the evening sky at the beginning of the month; on the 27th, however, it is in conjunction with the Sun and thereupon enters the morning sky. Greatest geocentric distance is reached the 26th at 1021 million miles.

URANUS: In Cancer, high in the northern heavens, rises before midnight. It is now pretty well placed for observation, but as it is a faint object, is best seen in the telescope. Since Uranus remains at about a degree northwest of Delta Cancri all month, a plot of the stars in that area will enable an observer to pick up this remote giant. On the 15th, distance is 1696 million miles.

NEPTUNE: plods along in Virgo, a few degrees east of Spica. Now in the morning sky, at magnitude 8 it can only be seen with optical aid. Too close to the Sun all month for worthwhile observation. Distance the 15th is 2902 million miles.

SATELLITES OF JUPITER

OCTOBER

Day	West							East
1			2·		○	1·	·3	·4
2				·1	○		3·	4· ·2●
3				1	○·	3·	2·	4·
4			3·	2·	○		4·	·1●
5		3·		·2	1· ○		4·	
6			·3		○	·1	·2	
7			4·	1·	○	2·		·3●
8		4·		2·	○	1·	·3	
9	4·			·1	○		3·	·2●
10	4·				○	1·	3· 2·	
11	·4			3·	2· ○			·1●
12		·4	3·	·2	1· ○			
13			·1	·3	○	·1	·2	
14				1· ·4	○	2·		·3●
15			2·		○	·4	·1 ·3	
16				·1	·2 ○		·4 3·	
17					○	1·	3· ·2	·4
18	○2·			3·	·1 ○			·4
19	○1·		3·	·2	○			4·
20			·3		○	·1	·2	4·
21				1· ·3	○	2·	4·	
22			2·		○	·1	3· 4·	
23	○4·			·1 ·2	○		·3	
24			4·		○	1·	·2 3·	
25	○3·	4·			·1 2 ○	·		
26	4·		3·	2·	1 ○	·		
27	4·		·3		○	·2		·1●
28	·4			·3	1· ○		2·	
29		·4		2·	○	·1	·3	
30			·4	1· ·2	○		·3	
31					○	1·	·2 3·	·4●

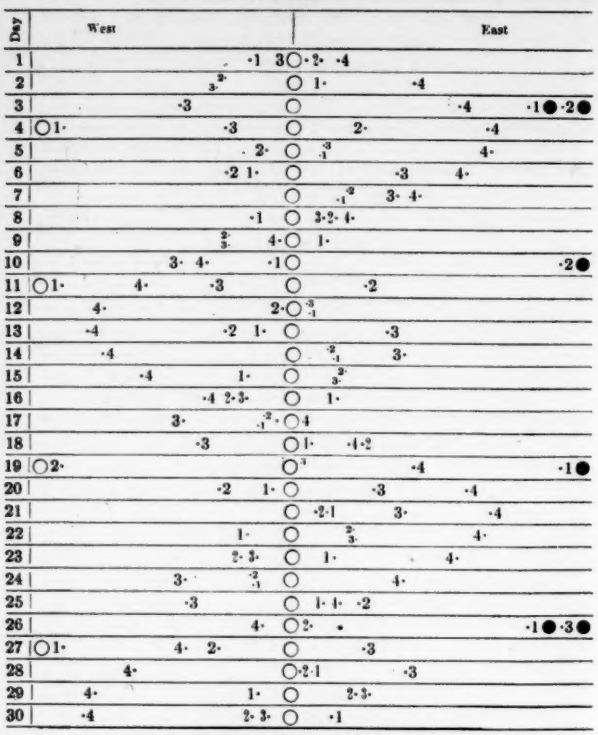
Appearance of Jupiter and its satellites at 6:00 A.M., E.S.T. as seen in an inverting telescope

Jupiter is represented by the disc in the center of the chart, and each satellite by a dot and its appropriate number. The direction of the satellite's motion is from the dot toward the numeral. The numeral. The numeral and light disc at the left margin of the chart indicates a satellite in transit across Jupiter's disc; the numeral and dark disc at the right margin indicates a satellite which is invisible because it is being eclipsed or occulted by Jupiter. This chart must be held upside down if binoculars, opera glasses, or an erecting type telescope is used.

XUM

SATELLITES OF JUPITER

NOVEMBER



Appearance of Jupiter and its satellites at 5:45 A.M., E.S.T. as seen in an inverting telescope

ASTRONOMICAL CALENDAR

Eastern Standard Time

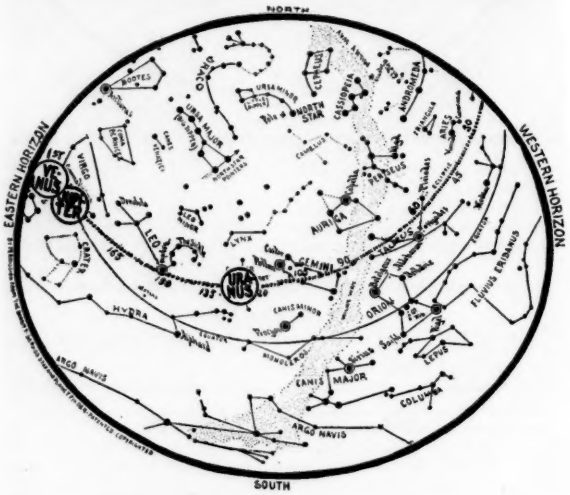
NOVEMBER, 1956

Nov.	1— 9:00 pm	Conjunction, Neptune and Moon; Neptune north 4° 21'
	2— 1:09 am	Conjunction, Mercury and Moon; Mercury north 3° 29'
	3— 1:38 am	Minimum of Algol
	4— 5:22 am	Conjunction, Saturn and Moon; Saturn north 1° 23'
	5—10:26 pm	Minimum of Algol
	6—10:— pm	Venus in perihelion
	8— 7:15 pm	Minimum of Algol
	11— 4:04 pm	Minimum of Algol
	11— 6:— pm	Mercury in descending node
	12— 7:— am	Uranus stationary in Right Ascension
	12— 4:— pm	Superior conjunction, Mercury and Sun; Mercury south 0° 6'
	13— 6:34 am	Conjunction, Mars and Moon; Mars south 6° 54'
	14—12:53 pm	Minimum of Algol
	17— 9:42 am	Minimum of Algol
	18	Total eclipse of the Moon
	20— 6:31 am	Minimum of Algol
	22— 1:— am	Mercury in aphelion
	22— 1:— am	Conjunction, Mercury and Saturn; Mercury south 2° 50'
	23— 3:10 am	Conjunction, Uranus and Moon; Uranus north 5° 45'
	23— 3:20 am	Minimum of Algol
	26—12:09 am	Minimum of Algol
	26—10:— am	Conjunction, Venus and Neptune; Venus north 0° 11'
	26— 8:06 pm	Conjunction, Jupiter and Moon; Jupiter north 6° 10'
	27—10:— am	Conjunction, Saturn and Sun
	28— 1:— pm	Venus greatest heliocentric latitude north
	28— 8:58 pm	Minimum of Algol
	29— 5:55 am	Conjunction, Neptune and Moon; Neptune north 4° 17'
	29—12:25 pm	Conjunction, Venus and Moon; Venus north 4° 7'

continued from page 3

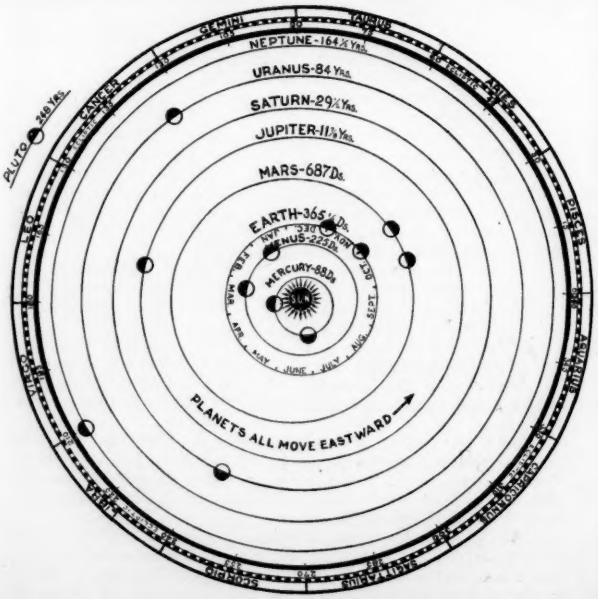
Shower	Dates of Maximum Frequency	Radiant Point
Orionids	October 18-20	A few degrees north-east of Betelguese in Orion
Leonids	November 13-15	The Sickle of Leo
Andromedids	November 17-27	Close to Gamma Andromedae
Geminids	December 10-12	Very close to Castor, in Gemini

MORNING SKY MAP FOR NOVEMBER



At 5:30 A.M., NOV. 1; 4:30 A.M., NOV. 15; 3:30 A.M., NOV. 30

HELIOCENTRIC POSITIONS OF THE PLANETS, NOVEMBER



XUM

AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

DECEMBER, 1956

THE SUN: this month the Sun's motion levels off in the southern hemisphere and northerly motion commences. It leaves Scorpio to enter Sagittarius. Distance from the earth the 1st is 91.6 million miles, and the 31st is 91.3 million miles.

There is a partial eclipse of the Sun on the 2nd, with 80½% of the Sun's diameter eclipsed at maximum. The area of visibility is limited largely to Asia, but also includes most of Europe, the north-east tip of Africa, and a small portion of the Indian Ocean. No portion of the eclipse is visible in the western hemisphere.

THE MOON: is at apogee the 7th at a distance of 252,000 miles, and is at perigee the 19th at 224,000 miles.

Libration: Maximum exposure of the region on the Moon's limbs takes place as follows:

December 9	South limb,	6.8°
December 14	East limb,	6.6°
December 22	North limb,	6.7°
December 26	West limb,	6.6°

The Moon's Phases (E.S.T.):

New Moon	December	2 at 3:12 am
First Quarter		10 at 6:51 am
Full Moon		17 at 2:06 pm
Last Quarter		24 at 5:10 am
New Moon		31 at 9:13 pm

MERCURY: speeds eastward from Ophiuchus, through Sagittarius, into Capricornus. In the evening sky all month, on the 24th it is at greatest elongation east of the Sun, and can be observed in the twilight glow, low in the west after sunset. Magnitude is about -0.3, which means that despite the remaining twilight it will appear as a bright star. On the 24th it will appear slightly gibbous, but Mercury's motion is so rapid that a week later it will appear as a distinct crescent. Its apparent diameter of 7" is appreciable under even moderate magnification. On the 1st it is 129 million miles from the earth, decreasing to 76 million miles the 31st.

VENUS: covers pretty much the same path that Mercury did in November—from Virgo, through Libra and northern Scropio, into Ophiuchus. Increasing distance, coupled with its position in relation to the Sun, is gradually worsening its morning sky location. It is still, however, observable before sunrise. The disc is now about 7/8 illuminated and of apparent diameter 12". Distance the 1st is 123 million miles, increasing to 137 million miles the 31st.

MARS: brilliant ruddy star, setting at about midnight. In Pisces all month, it crosses the equator into the northern hemisphere on the 8th. Increasing distance (from 74 million miles the 1st to 97 million miles the 31st) causes a drop in brightness during the month from magnitude -0.4 to 0.3, and a diminution in apparent diameter from 10" to 9". Telescopically, the disc will appear almost identical to that of Venus—that is, 7/8 illuminated.

JUPITER: is in Virgo all month in the morning sky, rising at about midnight. Practically on the equator, it is well placed for observation from almost any spot in the world. On the 15th it is 508 million miles away, with apparent diameter 36" (34" through the poles), and magnitude -1.6. The four bright moons are very interesting in their movements about their primary. These moons are readily visible with the smallest optical aid. Refer to the charts of the satellites elsewhere in this issue.

SATURN: moves slowly eastward in northern Scorpio. It is a morning star, but too close to the Sun to be observable. Distance the 15th is 1017 million miles.

URANUS: remains in Cancer. Though still technically a morning "star", it rises shortly after dark. Because of its faintness (magnitude 6) it is not an overly interesting object. However, its definite planetary nature is readily apparent in the telescope with powers of 50 diameters and upward. It is just visible to the naked eye, depending on atmospheric conditions and absence of Moonlight. Distance the 15th is 1655 million miles.

NEPTUNE: is now observable in the morning sky, but is a faint and uninteresting object. Opposition to the Sun will not take place until the spring. On the 15th, distance is 2874 million miles, and magnitude 8.

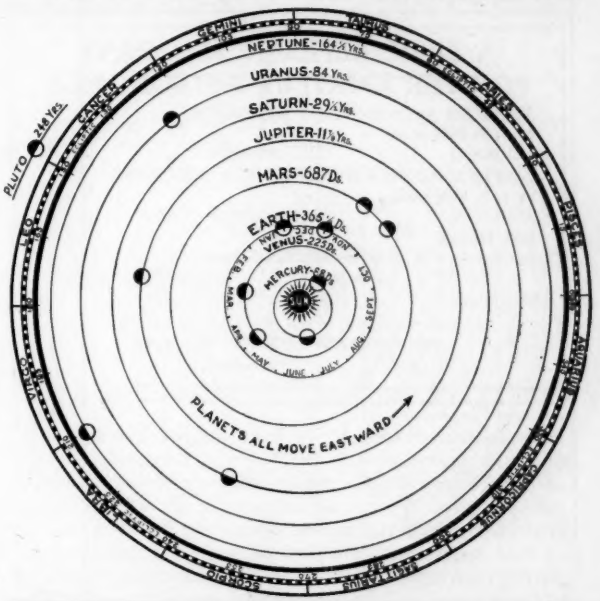
ASTRONOMICAL CALENDAR

Eastern Standard Time

DECEMBER, 1956

Dec. 1—	5:47 pm	Minimum of Algol
1—	7:25 pm	Conjunction, Saturn and Moon; Saturn north 1° 3'
2—		Partial eclipse of the Sun
3—	2:13 am	Conjunction, Mercury and Moon; Mercury south 4° 4'
4—	2:36 pm	Minimum of Algol
7—	11:25 am	Minimum of Algol
10—	8:14 am	Minimum of Algol
11—	2:41 pm	Conjunction, Mars and Moon; Mars south 4° 58'
12—	9:— am	Mercury greatest heliocentric latitude south
13—	5:03 am	Minimum of Algol
16—	1:52 am	Minimum of Algol
18—	10:41 pm	Minimum of Algol
20—	9:42 am	Conjunction, Uranus and Moon; Uranus north 5° 40'
21—	7:— am	Mars in ascending node
21—	4:00 pm	Sun enters Capricornus; Solstice
21—	7:30 pm	Minimum of Algol
22—	Noon	Quadrature, Jupiter and Sun
24—	6:32 am	Conjunction, Jupiter and Moon; Jupiter north 6° 2'
24—	4:20 pm	Minimum of Algol
24—	7:— pm	Mercury greatest elongation east, 19° 53'
26—	12:48 pm	Conjunction, Neptune and Moon; Neptune north 4° 10'
26—	4:— pm	Conjunction, Venus and Saturn; Venus south 0° 30'
27—	1:09 pm	Minimum of Algol
29—	7:54 am	Conjunction, Saturn and Moon; Saturn north 0° 44'
29—	2:17 pm	Conjunction, Venus and Moon; Venus south 0° 10'
30—	9:58 am	Minimum of Algol
31—	10:— am	Mercury in ascending node

HELIOCENTRIC POSITIONS OF THE PLANETS, DECEMBER



NOTES ON OBSERVATIONS OF MARS IN 1956

Under date of September 4th, the Harvard College Observatory announced the report from Dr. Gerald P. Kuiper of the McDonald Observatory in Texas, of the appearance of a large yellow cloud on Mars over the Mare Sirenum area. It was not present on August 29th; on August 30th it was about 1000 miles wide and on August 31st was some 250 miles wide and 3000 miles from tip to tip in a W-shape. Subsequent press reports indicate that this particular cloud condition is most unusual, and that it has obscured many of the markings normally apparent on the planet's surface.

A great world-wide observing campaign is underway, but it is still too early for any evaluation of results to be published. Methodical analysis of all observations, including thousands of photographs, will take considerable time. Particularly, results to date from the program headed by Dr. E. C. Slipher at the Lamont-Hussey Observatory in

continued on page 8

MORNING SKY MAP FOR DECEMBER

At 4:30 A.M., DEC. 1; 3:30 A.M., DEC. 15; 2:30 A.M., DEC. 31

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continued from page 7

Bloemfontein, South Africa have not been made public, under an agreement with the National Geographic Society of Washington, D. C., which will publish the results of this program. The special importance to be attached to observations from this station stems from the ideal location of this observatory (Mars at this approach passes almost directly overhead, thereby reducing atmospheric distortion to a minimum) and the experimental use of Image Orthicon (television) equipment. Used in conjunction with the observatory's large refracting telescope, the Image Orthicon is expected to yield photographs of Mars excelling by far anything previously possible.

The use of electronic equipment to supplement the optical telescope system is growing in importance. The Westinghouse Electric Corporation has announced developement of an image multiplier which, it is hoped, will increase the brightness of telescope images a hundred or more times. Scheduled for early trial with the 200-inch Mount Palomar telescope, this device will, if successful, give that instrument the effectiveness of a 2000-inch telescope. Functionally, the operation is much like television, with the ultimate image received on a phosphorescent screen.

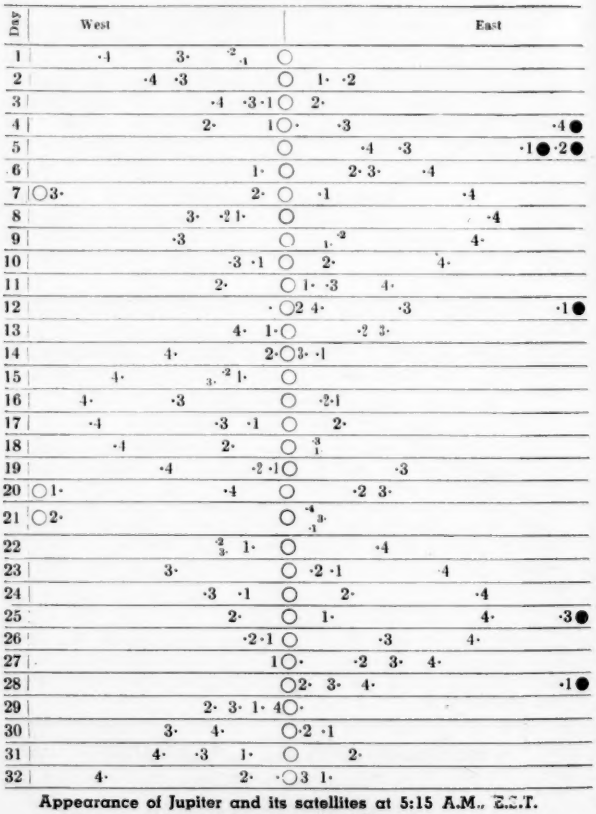
It is unfortunate that the boiling and shifting of our atmosphere raises such havoc with telescope images. Otherwise, there is hardly a limit to the theoretical size of an image a telescope could provide. From a practical standpoint, faintness and atmospheric blurring are the problems to be overcome. We should know soon if the answer lies in the use of electronic equipment.

THE EARTH SATELLITE—PROGRESS REPORT

The 20-million-dollar earth satellite project of the Office of Naval Research is gathering momentum. The three-stage rockets to be used to put the satellites into their orbits in space about the earth are presently under construction. In August, announcement was made that construction has started on the satellites themselves. They are to be spheres twenty inches in diameter, made of a highly reflective magnesium alloy, and will be packed inside with instruments. They will weigh a little over twenty pounds, including instruments. It is expected that they will be launched from the east coast of Florida in late 1957 or early 1958.

Scientists hope to obtain much useful information from the satellites, including the effect of meteoric particles on a craft in space. To enable scientists to keep track of the satellites, an elaborate network of observing teams has been set up. Once settled in its orbit, a satellite will travel at about 18,000 miles per hour, and since it will be relatively close to the earth's surface its period of visibility from any one location will be very short—of the order of a minute or so. Observational data secured will be fed to an electronic computer which will be able to turn out reliable predictions of its future path. Ultimately it is expected that atmospheric friction will brake the satellites sufficiently that they will be pulled to the earth's surface by the force of gravity, and will disintegrate like meteors.

SATELLITES OF JUPITER
DECEMBER



Appearance of Jupiter and its satellites at 5:15 A.M., E.S.T. as seen in an inverting telescope

MANUSCRIPTS

The "MAP" is happy to receive manuscripts and will publish any and all considered as conforming with the fundamental purpose of this publication. We feel that, in keeping with the wishes of our readers, we cannot use material of too highly theoretical or technical a nature.

XUM

BOOK REVIEWS

THE STARS BY CLOCK AND FIST

by HENRY M. NEELY

(The Viking Press, New York, 1956)

The author of this book, Henry M. Neely, is a veteran lecturer of the Hayden Planetarium in New York City. Interested in astronomy since scoutmaster days of 1912, he is the author of two previous books on star identification. This latest work, *The Stars By Clock And Fist,* just off the press, is basically a treatment of the method he developed to simplify the identification of stars, constellations, and planets. As the title suggests, the method employs a clock and a fist. This clock is imaginary, with the face on the ground, and 12 o'clock pointing north. Then 3 o'clock becomes east, 6 o'clock south, and 9 o'clock west. Using the fist to measure altitude, a little practice in holding the fist at the right distance from the body will give an acceptable measure of ten degress. We are then ready to use Mr. Neely's star lists in the book, for every hour of the night and every day of the year, to tell you what hour on the imaginary clock to face to see each celestial object. Together with the tabulation of the number of "fists" above the horizon, identifications are easy.

This latest book of Mr. Neely's contains 192 pages, including many pages of star charts, lists of the brighter stars, and positions of the four major naked-eye planets for about 15 years. Of particular interest to the young and the layman.

(Available through The Monthly Evening Sky Map, $4.15, postpaid)

DISCOVER THE STARS

by GAYLORD JOHNSON, with additions by IRVING ADLER

(Sentinel Books Publishers, Inc., New York, 1954)

An inexpensive, paper-bound book of 130 pages crammed with facts and simple but practical experiments. Designed to whet the appetite of the youngster (or oldster, for that matter) the particular niche carved by this volume lies in its approach to the teaching of astronomy by experiment, with less emphasis on the customary textbook-like narrative. For instance, the authors star right in Chapter 1 with a simple mechanical device—an umbrella and chalk—to teach and explain fundemental motions and basic star groups. Later on we go into experiments which demonstrate why summer is hotter than winter; why Mercury and Venus exhibit phases like the Moon; how to measure angular distance in the sky; how to determine the diameter of the Moon; and many others. This book, with its up-to-date accounts of the past and present in astronomy will furnish any beginner with an excellent foundation for reading and understanding the detailed standard works on the subject.

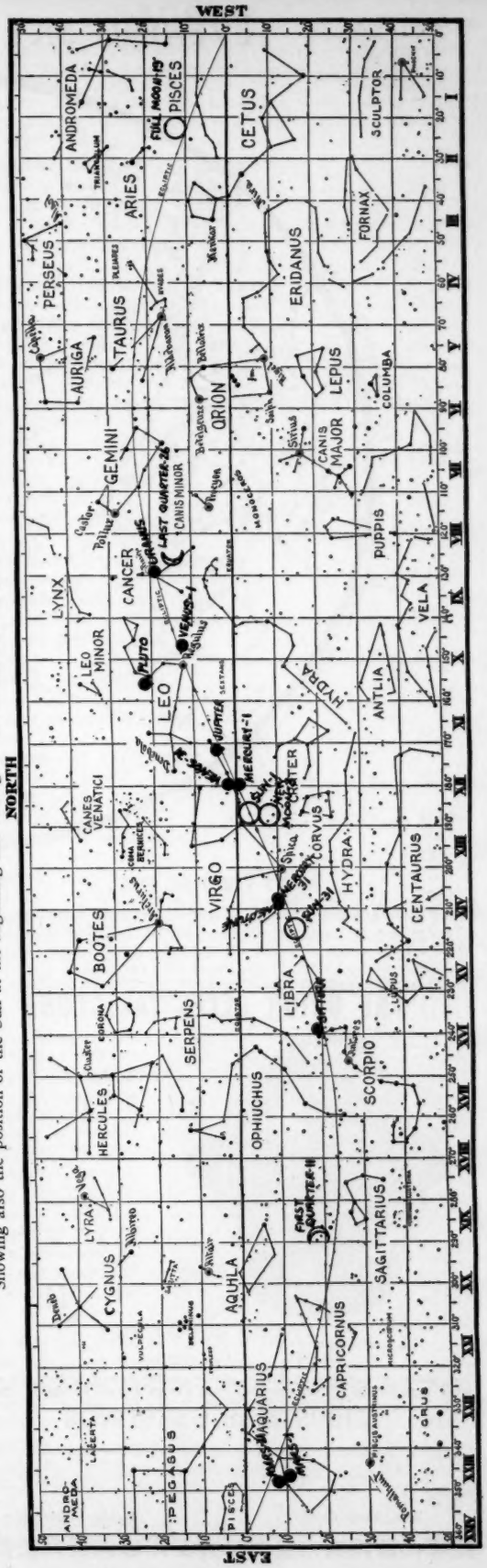
(Available through The Monthly Evening Sky Map, $...85, postpaid)

WIRTANEN OBJECT (1948 OA)

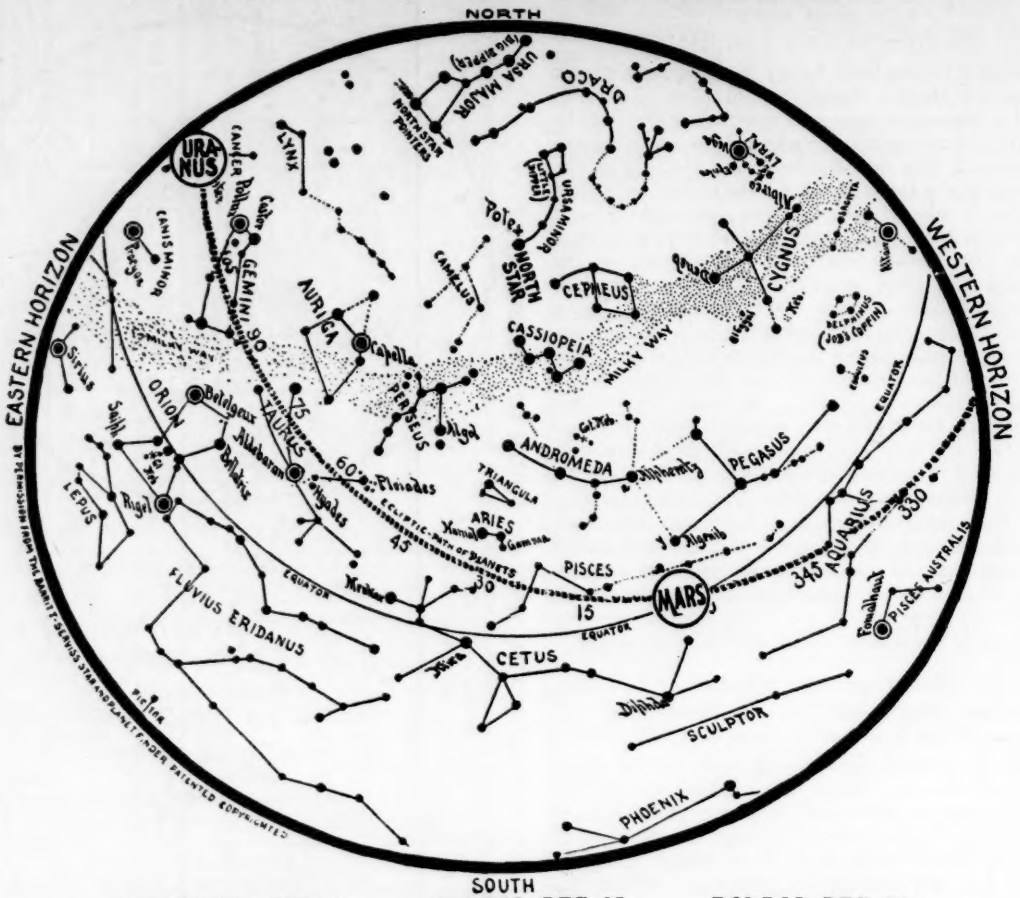
The Harvard College Observatory announced the recovery on July 27 of 1948 OA, by Carl A. Wirtanen of the Lick Observatory. This object, presumably an asteroid, had not been seen since discovery in 1948. It is particulary valuable as it is one of the asteroids which can come very close to the earth. We have not seen orbital elements and accordingly cannot say exactly how close an approach this asteroid can make, but at its closest this year, on August 10, it was only about 12,000,000 miles away. At perihelion, 1948 OA is well within the orbit of the earth. Its path this summer was unusual and interesting, being practically a straight line taking it through Cygnus, Cepheus, Draco, Ursa Minor, Camelopardalis, Draco, and Ursa Minor, in turn. On about August 18 it was within five degrees of the North Pole! Its brightest at this opposition was magnitude 13.

A MERCATOR PROJECTION OF THE STAR FIELD FOR 50° NORTH AND 50° SOUTH OF THE EQUATOR

The Star Field makes an apparent complete revolution westward every 24 hours, hence the hourly division from I to XXIV, but this has no relation to the time that any portion of the map is in view. Practical as a Star, Constellation and Planet Finder for the current month—October, 1956—Anywhere in the world.
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases.



EVENING SKY MAP FOR DECEMBER



AT 9:00 P.M., DEC. 1 **8:00 P.M., DEC. 15** **7:00 P.M., DEC: 31**

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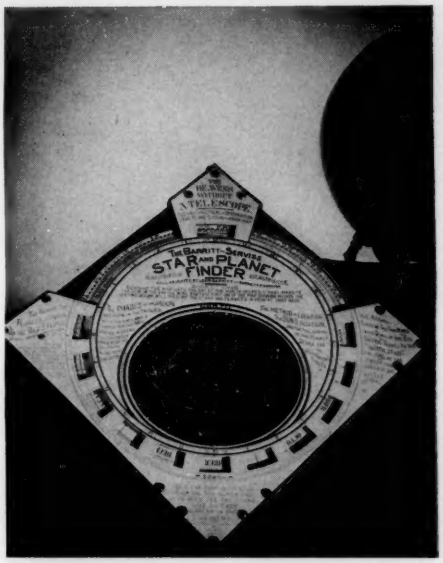

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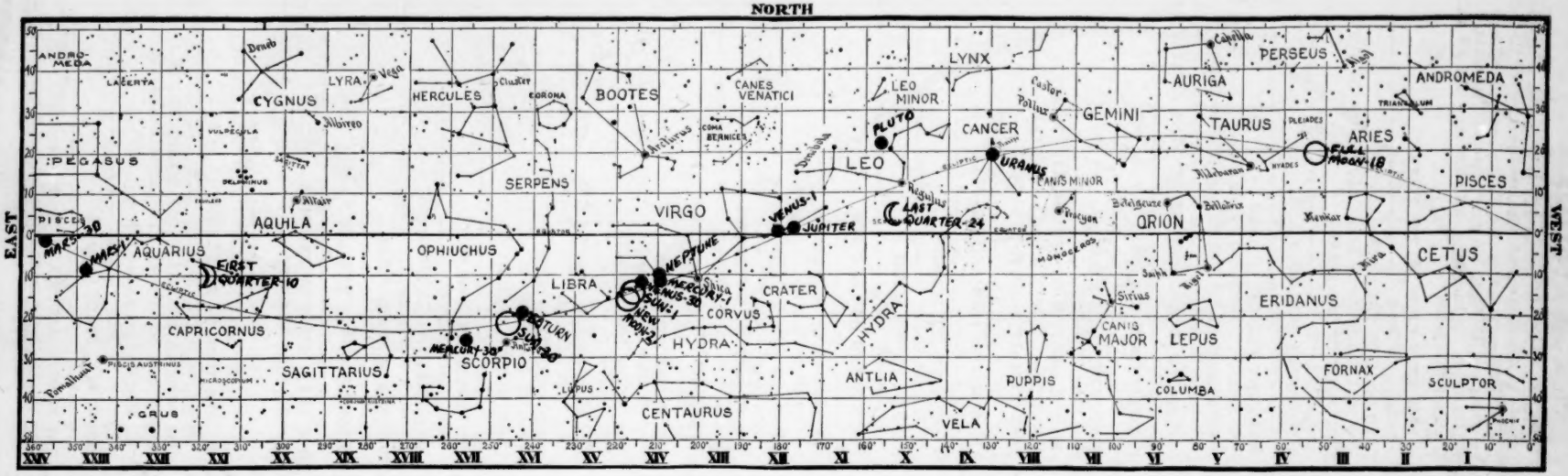
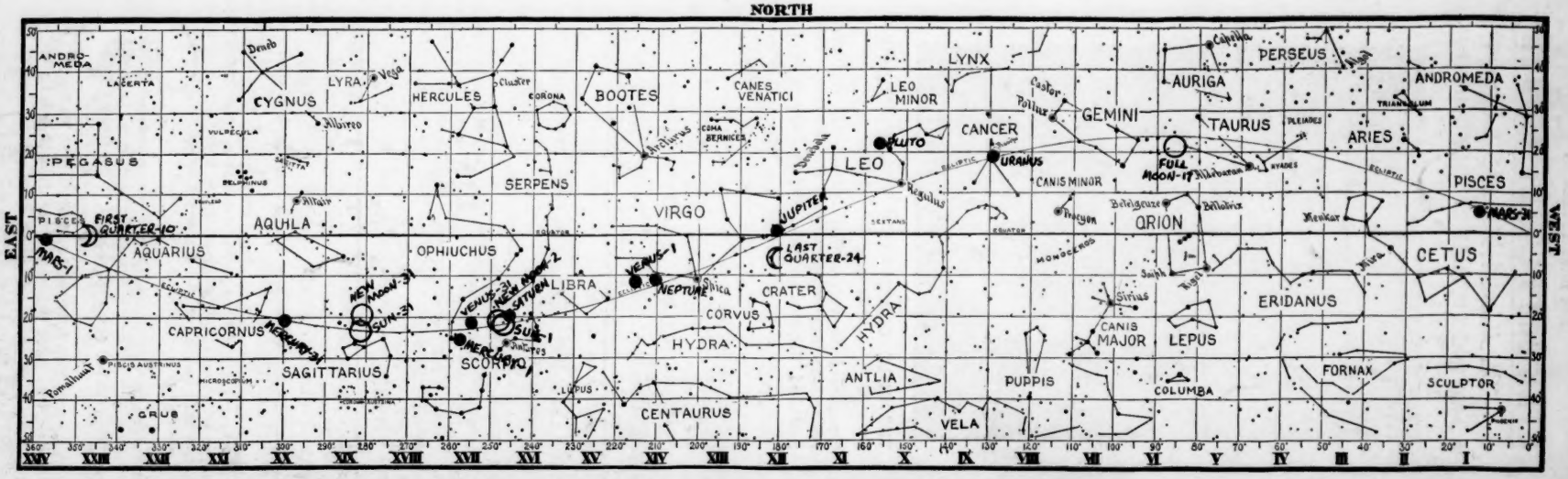
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases.





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Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. [illegible] Dec. [illegible]

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